EFFICACY OF SYNECTICS MODEL OF TEACHING IN ENHANCING PROBLEM SOLVING ABILITY, TEACHING SKILLS AND CREATIVITY OF PUPIL TEACHERS

A

SYNOPSIS

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1.0.0 Introduction

The initial stage of teaching methods was truly based on teacher centered approach where child has a passive role in classroom. These methods were lack of goals called development of creativity, behavior modification, and brainstorming, perception of new ideas, imagination, metaphorical thinking and use of analogies for better learning. Today the development of models of teaching is the recent innovation in teaching. An important purpose of discussing models of teaching is to assist the teacher to have a wide range of approaches for creating a proper interactive environment for learning. An intelligent use of these approaches enables the teacher to adapt to the learning needs of the students.

Models of teaching afford a lively and proactive introduction to the complexities of teaching. A teaching model is not a substitute for teaching skill. A model cannot take the place of fundamental qualities in a teacher, such as, knowledge of subject matter, creativity and sensitivity to people. But it is a good tool to help good teachers to teach more effectively by making their teaching more systematic and efficient. In very simple terms 'Models of teaching' are a pattern or plan which can be used to shape a curriculum or course to select instructional materials and to guide a teacher's action and to teach model can be considered as a type of blue print for teaching. It provides structure and direction for the teacher. In short, 'Models' are teaching-strategies designed to accomplish particular instructional goals.

There are large numbers of models of teaching for enhancing students' proficiency in various domains. Some of the well known models include creative thinking, Problem solving ability such as brainstorming ,brain calming, mind control, scenario writing, meditation, creative dreaming, socio-drama, psychodrama, destructuring-restructuring, imagery, analogy, awareness, development, gestalt therapy etc. Synectics model of teaching encourages greater creativity and allow students to use metaphors, analogies and compressed conflicts to create a paradigm shift in thinking. Alternatives to typical classroom thought processes are allowed to emerge as students begin to use right brain functions. The exercise may be used to make the familiar strange, or to take the familiar and see it in a totally new perspective. Although some students may very well be more

creative than others, the Synectics model has the ability to awaken the "creative thinker" in every student, using guided techniques and activities and to create a safe environment for all students, the Synectics Model can be introduced through a class brainstorming activity that sets the tone for smaller group and individual activities designed to help students learn in a more creative and fun way.

1.1.0 Synectics Model

Synectics is an instructional model designed to activate students' creativity and help them see old ideas in new ways through employing various forms of metaphoric thinking to activate "generative thinking." Models of teaching were identified and described for the first time by Joyce and Weil (1980). *"A model of teaching is a set of inter-related components arranged in a sequence which provides guidelines to realize a specific goal. It helps the designing instructional activities and provides an environment carrying out these activities in order to realize the stipulated objectives".*

Synectic Model*:* In 1961, William .J. Gordon and his associates designed a very interesting and delightful experience for the development of innovations known as Synectics. The model was originally designed to form 'creativity groups' in industrial and other organizations to solve problems in order to develop quality products. Characteristics of Gordon's Model are i) creativity is important in everyday activities. It is designed to increase problem solving, creative expression, empathy and insight into social relations. ii) The creative process is not at all mysterious and it is possible to train persons directly to increase their creativity. iii) Creative invention is similar in all fields-the arts, the sciences, engineering and is characterized by the same underlying intellectual processes. iv) Individual and group inventions (creative thinking) are very similar .Individuals and groups generate ideas and products in much the same fashion.

The name Synectics was coined by combining Greek root words and translates into, roughly, "the bringing together of diverse elements." This choice resulted from the recognition that the essence of many innovative ideas is the combining of two or more hitherto unconnected or even contradictory elements. The presence of diverse participants

has a positive impact on creative group problem solving for several reasons. First, people with differing backgrounds (professionally as well as personally) will bring a vast amount of expertise in all sorts of fields to the task and this will expand the scope and enrich the thinking of the full group. Second, specialists in any one field (engineering, marketing, sales, office work, fundraising) share many basic assumptions they have been taught or learned in training or by experience. Yet, the most innovative ideas often are those that challenge or shift basic assumptions. Third, the presence of people with a different outlook and, often, "impossible" ideas can stimulate the thinking and connection-making ability of specialists so that fresh ground is covered and they gain insights into the task so, the Synectics process addresses each of these elements. Ways to maintain a climate that fosters risk taking and inventive thinking, a proprietary problem-solving process that nurtures beginning ideas and drives them to possible solution, and techniques to stimulate "out of the box" thinking are critical aspects of the Synectics experience. It will cover the facilitator role, which was a startlingly new concept initially, and then share a few techniques useful for triggering creative thinking by participants in a group session. The facilitator manages the process of the meeting, not its content. Thus, trust is built between facilitator and participants as it becomes evident that the solution will, in fact, come from the group and that no pre-existing idea will be foisted on them.

Basic Synectics Process can be discussed in two *phases* like *i) make the Strange Familiar*: Understand the problem – analytical phase. Understand the problem until you are at home with it. *ii) Make the Familiar Strange*: Distort, invert or transpose the everyday ways of looking and responding. Techniques to Make the Familiar Strange are a) Personal Analogy – see yourself as the spring. b) Direct Analogy – use animals or other devices. c) Symbolic Analogy – use constructs or symbols. d) Fantasy Analogy – invent something that could be used as an analogy.

1.2.0 Problem Solving Ability

A problem exists when a problem solver has a goal but does not know how to accomplish it. Specifically, a problem occurs when a situation is in a given state, a problem solver wants the situation to be in a goal state, and the problem solver is not aware of an obvious

way to transform the situation from the given state to the goal state. In his classic monograph, *On Problem Solving*, the Gestalt psychologist Duncker (1945) defined a problem as follows:*A problem arises when a living creature has a goal but does not know how this goal is to be reached. Whenever one cannot go from the given situation to the desired situation simply by action, then there has to be recourse to thinking. Such thinking has the task of devising some action, which may mediate between the existing and desired situations.* Mayer and Wittrock (2006) defined Problem solving as *"cognitive processing directed at achieving a goal when no solution method is obvious to the problem solver"* This definition consists of four parts: (1) problem solving is cognitive, (2) problem solving is a process, (3) problem solving is directed, and (4) problem solving is personal, In sum, problem solving is cognitive processing directed at transforming a problem from the given state to the goal state when the problem solver is not immediately aware of a solution method. It is related to other terms such as thinking, reasoning, decision making, critical thinking, and creative thinking. Thinking refers to a problem solver's cognitive processing, but it includes both directed thinking (which is problem solving) and undirected thinking (such as daydreaming). Problem solving requires analytical or logical thinking which includes skills such as ordering, comparing, contrasting, evaluating and selecting. It provides a logical framework for problem solving and helps to select the best alternative from those available by narrowing down the range of possibilities (a convergent process). Analytical thinking often predominates in solving closed problems, where the many possible causes have to be identified and analyzed to find the real cause. Creative thinking is a divergent process, using the imagination to create a large range of ideas for solutions. There is a large element of creative thinking in solving open problems. So, the development and use of problem-solving ability also improves learning. Rossman (1993) *"The role of the student changes from a passive recipient of information to a participant in the creation of understanding. The problem should captivate students' attention, be meaningful, and allow a wide range of individual responses."*

It focuses to gathered the students' prior knowledge so that he could assess their background and then decide how best to approach the problem. The students could also

be given the opportunity to "own" the problem instead of just being given a problem that they may not have interest in or any prior knowledge about. This can be done by simply asking the students what problems they would like to solve. Problems solving usually involved the following steps: i) Identify the problem, ii) Analyze the problem and gather information, iii) Generate potential solutions, iv) select and test the solution, v) Analyze/Evaluate the results and helps to learner to be a good problem solver and it requires to be able to switch from one group of skills to the other and back again, although this is not always easy.

1.3.0 Creativity

When a student is asked to "invent" a solution to a problem, the student must draw upon previous knowledge, skills, creativity, and experience. The student also recognizes areas where new learning must be acquired in order to understand or address the problem. This information must then be applied, analyzed, synthesized, and evaluated. Creativity means bringing into being; it involves the generation of new things or ideas or the transformation of those previously existing.

A simple definition is that creativity is the ability to imagine or invent something new. Creativity is not the ability to create out of nothing but the ability to generate new ideas by combining, changing, or reapplying existing ideas. Some creative ideas are astonishing and brilliant, while others are just simple, good, practical ideas that no one seems to have thought of yet. Everyone has substantial creative ability. Children are highly creative and in adults, creativity has too often been suppressed through education, but it is still there and can be reawakened. Often all that is needed to be creative is to make a commitment to creativity and to take the time for it. Few characteristics of the Creative Person are that he is curious, seeks problems, enjoys challenge, works hard etc optimistic, able to suspend judgment, comfortable with imagination, sees problems as opportunities, sees problems as interesting, problems are emotionally acceptable, challenges assumptions and do not give up easily etc..

Therefore, Creative people work hard and continually to improve ideas and solutions, by making gradual alterations and refinements to their works. They know that there is

always room for improvement. Every problem has only one solution (or one right answer). The goal of problem solving is to solve the problem, and most problems can be solved in any number of ways. If you discover a solution that works, it is a good solution. There may be other solutions thought of by other people, but that doesnot make your solution wrong. What is the solution to putting words on paper, Fountain pen, ball point, pencil, marker, typewriter, printer, Xerox machine, printing press? Creative answers are complex technologically. Only a few problems require complex technological solutions. Most problems we will meet with require only a thoughtful solution requiring personal action and perhaps a few simple tools. Even many problems that seem to require a technological solution can be addressed in other ways.

1.4.0 Teaching Skills

The aim of all teaching activity is to facilitate and support student learning but every assessment requires both general knowledge about the nature of the phenomenon to be assessed and specific knowledge about what aspects are important for the assessment. In this respect there is no difference between the assessment of academic skills and teaching skills. However, the tradition and consensus that exist in connection with judging academic skills do not exist in relation to teaching skills.The teaching skills emphasize three aspects when defining the teaching skills. They focus on i) What teachers do (different kinds of abilities?) ii) Different kinds of knowledge that teachers need in order to be able to act in the best possible way. iii) Attitudes and underpinning values that teacher embrace.

A few prominent aspects of teaching skills can be discussed as the scientific approach involves applying the same kind of thinking in relation to teaching as is done within research. Evidence of this could be that the teacher applies a well motivated teaching philosophy has a clear conception of the roles and responsibilities of student and teacher informs students about the reasons for his or her decisions on teaching strives for good contact with all students. It creates a good teaching climate and knows about students' previous knowledge and qualifications which help students to develop good study habits, listens to students stimulates who are to be active learners.

Knowledge is the basis to demonstrated teaching skills. A teacher needs knowledge in four areas: *i) About the subject area (content knowledge) ii) About student learning (pedagogical knowledge) iii) About teaching (instructional knowledge) iv) About educational goals and organization (curricular knowledge).* Practice Demonstrates teaching skills means putting the acquired knowledge of different kinds into practice. Demonstrating teaching skills also involves regularity at all times striving to do one's best. To give a splendid performance once, e.g. when giving a trial lecture, does not call for the kind of skill that is needed to continuously provide the best possible support for student learning but to improve one's teaching leads to teaching excellence entails a desire for development and continuous updating of knowledge and skills. Learning from experience good as well as bad is a distinguishing trait. Knowledge about teaching raises the few points that the teacher should have like: i) Is familiar with requirements and consequences connected with different teaching methods. ii) Has good knowledge about the different parts of the teaching process. iii) Has used different teaching methods. iv) Is familiar with a variety of examination and assessment methods. v) Is continuously developing his or her knowledge by attending courses on teaching or pedagogical conferences.

Knowledge about educational goals and organization implies that the teacher is aware of the general goals and regulations of higher education and has good curricular knowledge which makes sure that the course goals are attained, through teaching methods and content according to available resources. And Applied teaching skills master different teaching methods which are according to student needs, structures the material in a way that is beneficial to student learning, It provides clear information in good time, gives prompt feedback, provides overviews of courses and class contents, uses a variety of examination methods, develops study guides or writes teaching materials, works well together with other teachers and personnel. Leadership, administration and cooperation can also be involved as a good teaching skills and creating good conditions for student learning in other ways than in direct connection with the planning. Cooperation with others and contacts with the surrounding society help to informed about changes in the school system and its consequences for education.

1.5.0 Emergence of the Problem

The NPE 1986 devotes a section on "The Teacher": "The status of the teacher reflects the socio-cultural ethos of a society; it is said that no people can rise above the level of its teachers. The government and the community should endeavour to create conditions that will help motivate and inspire teachers on constructive and creative lines. Teachers should have the freedom to innovate, and to devise appropriate methods of communication and activities relevant to the needs, capabilities and concerns of the community.

Every child deserves a caring, competent and qualified teacher. Research evidence has shown that the quality of teaching in our classrooms is the most important school-related factor in ensuring students' achievement (Greenwalls, 1996). Therefore, policy makers at all levels are focusing on teacher quality with emphasis on the issues of teacher recruitment, preparation, licensing and certification standards, as well as professional development. A high quality teacher is one who understands and demonstrates ability to address the content, character, challenges and complications of being a teacher.

There is a shortage of qualified teachers and poor condition of teaching are the major factors affecting the quality of education because of inappropriate training of pupil teachers. The decreasing level of teaching, training with lack of creativity, problem solving ability, teaching skills and motivation affect their performance in the classroom and reduce the ability of students to achieve satisfactory learning outcomes, thus reducing their capability to deliver quality education. Teachers feel ignored in the decision-making process and powerless in their efforts to improve the learning experience of their students, despite their desire and enthusiasm. Giving lecture style presentations is often

regarded as old-fashioned and connected with many disadvantages: Lectures fail to provide instructors with feedback about student learning and rest on the presumption that all students learn at the same pace. Moreover, students' attention wanes quickly during lectures and information tends to be forgotten quickly when students are passive. Finally, lectures emphasize learning by listening, which is a disadvantage for students who prefer other learning styles. The modern teaching model for enhancing creative thinking, Problem solving ability such as brainstorming ,brain calming, mind control, scenario writing, meditation, creative dreaming, socio-drama, psychodrama, destructuring - restructuring, imagery, analogy, awareness, development, gestalt therapy etc and became successful to enhance the basic skills and quality of learning of teachers.

Models like brainstorming, brain calming, gestalt therapy, imagery, analogy all focused on i) involving learner as a group and teach them expressing ideas and listening to what others say, adjust their previous knowledge or understanding, accommodate new information and increase their levels of awareness, ii) It helps to explain recurring learning behaviors, that includes an eclectic mix of techniques. This form of learning also encompasses such newer educational concepts, iii) It teaches therapists and patients the phenomenological method of awareness, in which perceiving, feeling, and acting are distinguished from interpreting and reshuffling preexisting attitudes. Explanations and interpretations are considered less reliable than what is directly perceived and felt.

The teaching model like Synectics model is much more student-centered. According to Jim Scrivener, the teacher's main role is to "help learning to happen," which includes "involving" students in what is going on "by enabling them to work at their own speed, by not giving long explanations, by encouraging them to participate, talk, interact, do

things, etc." (Scrivener). Broughton adds that "the language student is best motivated by practice in which he senses the language is truly communicative, that it is appropriate to its context, that his teacher's skills are moving him forward to a fuller competence in a foreign language" (Broughton 47), the students are the most active element in this process. The teacher is there not to explain but to encourage and help students to explore, try out, make learning interesting etc.

Above analysis raised few questions in the mind of researcher such as:

1. How can the Synectics model of teaching provide quality of learning to students?
2. How problem solving abilities are helpful to solve difficulties in learning?
3. Does Synectics model really help to enhance teaching skills of pupil teachers?
4. Why are traditional methods losing their importance in teaching?
5. Why does it move the student towards the boredom?
6. Is this model effective in enhancing learners' skills?

1.6.0 Statement of the Problem

In order to find out the answers of above mentioned research questions the following problem has been selected for the present study:

Efficacy of Synectics Model of Teaching in Enhancing Problem Solving Ability, Teaching Skills and Creativity of Pupil Teachers.

1.7.0 Justification of the Study

Synectics Model is an interesting new approach to the development of creativity and problem solving ability and teaching skills. Variables like creativity and problem solving ability are the major dimensions of Synectics model to acquire any skills (Teaching

skills) and learning. Some studies in this area focus on difference and comparison with the Synectics method, brainstorming and deductive method. Synectics method and brainstorming have a greater effect on student creativity and that the former, in its turn, improves this variable much more than the deductive method (Madahi, 2010).And some studies focus on enhancement of people's divergent thinking and capacity for solving problem by using of Synectics Model and helps to education students and Technology students Association members to get widespread success by the use of technology, (Laura, 2006). This model has also presented as a problem solving tool for learner and educational leaders' too (Georgiou, 1994). The Synectics Model is well connected to enhancement of language creativity, it proved its effectiveness on general creativity and they come up with innovative ideas, (Vani 2012).

Many researchers have done on brainstorming approach, deductive and creative thoughts, metaphorical thinking which show greater effect towards generation of new idea, rational power, imagination and highest level of developmental thinking etc but no significant research has been carried out concerning the Synectics model and its impact on problem solving ability, teaching skills and creativity etc. Various researches that have been conducted in this area are given below:

Table 1.1: Exhibiting Researches Conducted Abroad

S.No.	Year	Name of Researcher	Aim	Findings
1.	2011	Kaplan, Ercan	A sample study on synectics activities from creative thinking methods: creativity from the perspective of children	It was seen that the students began to see creativity in a different way and to perceive it as a process at the end of the synectics applications, rather than just an activity aiming at creation of an original product.
2.	2010	Madahi, Khalatbari	Comparison of effectiveness of the three methods of brainstorming, synectics and deductive on increasing creative thought in female students	There is such a difference and that compared with the synectics method, brainstorming has a greater effect on student creativity and that the former, in its turn, improves this variable much more than the deductive method.
3.	2010	Sadathoseini , Memarian	The Effect of Employing Synectic Model in Teaching Palliative Care in Children on Nursing Students' Writing Creativity and Academic Performance	With regard to the results of this study, employing synectic method enhances academic performance and writing creativity of nursing students regarding children's Palliative Care.
4.	2009	Walker	Promoting Metaphorical Thinking through Synectics: Developing deep Thinking Utilizing Abstractions	If one uses the revised taxonomy, learning is utilizing a creative factor in developing writing that summarizes and reflects upon prior knowledge and new connections, and it is considered to be on the highest level of developmental thinking.
5.	2006	Laura	Synetcics for Creativity Thinking in Technology Education: An Instructor using Synectics and Creative problem-Solving Techniques can teach Students to Solve a Multitude of Academic Challenges	By Using Synectics, people's divergent thinking and capacity for solving problem increase .Using Synectics with techonolgy education students and Technology students Association members have had widespread success.
6.	1995	Meador	The Effect of Synectics Training on Gifted and Nongifted Kindergarten Students	A post hoc analysis in the level of response for the gifted and nongifted experimental groups showed qualitative differences worthy of future study.
7.	1994	Georgiou	Synectics: A Problem-solving Tool for Educational Leaders	Problem-solving approach, which resulted as an accumulated body of knowledge about creativity and group dynamics considered routine and creative thinking as extremes on a continuum, and explores the notion of left and right brain thinking, as well as the 'cultural division of the self' into safekeeping and experimental selves; describes a five-session synectics programme which enables the learning of creative skills.

Table 1.2: Exhibiting Researches Conducted in India

S.No.	Year	Name of Researcher	Aim	Findings
1.	2012	Vani	Effectiveness of Synectics Model of Teaching in enhancing language creativity of Learners.	The findings of the study are that language creativity is enhanced when the students are exposed to synectics model of teaching. Not only the language creativity, it proved its effectiveness on general creativity and they come up with innovative ideas.
2.	2012	Patil	Effectiveness of Synectics Model (SM)	During the experiment it is found that students were interested in teaching by Synectics Model (SM) so Models of Teaching should be adopted extensively in teaching at secondary level.
3.	2010	Patel	Development of an Instructional strategy for Primary school teachers to teach creative and critical thinking skills	Sampled teachers improved their fluency, flexibility and originality dimensions of creativity thorough the instructional strategy. Sampled teachers improved their ability to think critically thorough the instructional strategy.
4.	2010	Pany	Effectiveness of Synectics Model of Teaching in enhancing Creativity, Academic Achievement and Achievement Motivation.	The Making Familiar Strange (MFS) approach of synectics model of teaching was found to be effective in enhancing the creative thinking ability of the learners.The MFS approach of synectics model of teaching did not prove to be effective in enhancing the achievement motivation of the learners.The MFS approach of synectics model of teaching did not put any significant impact upon the achievement of the learners in the subject General science.
5.	2008	Paltasing	Impact of Synectics model of teaching in life science to develop creativity among pupils	It can be concluded that the experimental group taught through synectics model obtains significantly higher post test scholastic achievement score than the control group.
6.	2008	Thakur	Making Familiar Strange (MFS) Approach of Synectics Model of teaching : A Treatment For Enhancing Creativity And Academic Achievement Of Learners	Creativity of the learners of both the control and the experimental groups are found equivalent after pretest. Making Familiar Strange (MFS) approach of synectics model of teaching is found to be effective in enhancing the creativity of the learners.

Review of related literature leads to conclusion that there is a need to study on the utility of new creativity enhancing model like Synectics model of teaching and how can problem solving abilities, teachings skills and creativity perform positively in learning?

1.8.0 Definition of the Terms

1.8.1 Synectics Model

To achieve radical new approaches to old problems it is essential to take 'psychological chances,' to abandon familiar ways of looking at things, even to transcend one's image of oneself.The Synectics Process involves making the strange familiar and the familiar strange.

Gordon (1960)

Operational definition

Synectics model is a model to identify and solve problems that depends on creative thinking, the use of analogy, and informal conversation among a small group of students with diverse experience and expertise.

1.8.2 Problem Solving

A problem is a situation which is experienced by an agent as different from the situation which the agent ideally would like to be in. A problem is solved by a sequence of actions that reduce the different between the initial situation and the goal.

Heylighen, (1998)

Operational definition

Problem solving is thinking that is directed toward the solving of a specific problem that involves both the formation of responses and the selection among possible responses.

1.8.3 Creativity

Creativity is the act of turning new and imaginative ideas into reality. Creativity involves two processes: thinking, then producing. Innovation is the production or implementation of an idea. If you have ideas, but don't act on them, you are imaginative but not creative."

Linda (2011)

Operational definition

Creativity is considered to be involved with the creation or generation of ideas, processes, experiences or objects; critical thinking is concerned with their evaluation.

1.8.4 Teaching Skills

Teaching skills as strategies that teachers use which facilitate pupils' learning and which are acknowledged by those competent to judge as being skills.

Wragg (2005)

Operational definition

The teaching skills are defined as a group of teaching acts or behaviors intended to facilitate students learning directly or indirectly.

1.9.0 Objectives of the Study

1. To develop lesson plans based on Synectics Model of teaching for teaching pupil teachers.
2. To study the effectiveness of Synectics Model of teaching in enhancement of problem solving ability of pupil teachers.
3. To study the effectiveness of Synectics Model of teaching in enhancement of teaching skills of pupil teachers.
4. To study the effectiveness of Synectics Model of teaching in enhancement of creativity of pupil teachers.

1.10.0 Hypotheses of the Study

1. There will be significant effect of Synectics Model in development of problem solving ability of pupil teachers.
2. There will be significant effect of Synectics Model in development of teaching skills of pupil teachers.
3. There will be significant effect of Synectics Model in development of creativity of pupil teachers.

1.9.0 Delimitation of the Study

1. The present study is delimited to the Agra city only.
2. Present study will include pupil teachers who have opted for Methodology of Teachings Social Studies only.
3. The experiment is confined to 30 lesson plans only.

1.10.0 Variables of the Study

The variables of study have been classified as following:

1.10.1 Independent Variable: In the present study synectics model of teaching has been taken as an independent variable as its impact will be seen on other variables of the study.

1.10.2 Dependent Variables: In the present study problem solving ability, teaching skills and creativity will be selected as dependent variables.

1.10.3 Controlled / Extraneous Variables: Age, content, teacher- educator, time schedule during teaching, etc.

1.11.0 Methodology of the Study

The methodology of the study has been stated in the following heads:

1.11.1 Method of the Study

Method is a style of conducting a research work and is determined by the nature of the problem, keeping in view the nature of the problem, the researcher will adapt Experimental Method that involves manipulating one variable to determine if changes in one variable cause changes in another variable. This method relies on controlled methods, random assignment and the manipulation of variables to test a hypothesis. It is a blueprint of the procedure that enables the researcher to maintain control over all factors that may affect the result of an experiment. The researcher will attempt to determine or predict what may occur. Experimental Research is often used where there is time priority in a causal relationship (cause precedes effect), there is consistency in a causal relationship (a cause will always lead to the same effect), and the magnitude of the correlation is great.

1.11.2 Research Design

Pre test- Post test Randomized Group Design*:* In this Design, two random samples are drawn and pre- tested on the criterion variables. One of the samples will be given treatment and after that, the observation is obtained on the experimental as well as control group.

For the purpose of experimentation two institutions of Agra city will be purposively selected. Both experimental and control group will be selected on the basis of their academic score to make them equivalent group. The experimental group will be taught by the investigator herself by Synectics model of teaching whereas the investigator will also teach the control group by the traditional method of teaching.

The design is shown as follows:

Table 1.3: Planning of the elements of methodology of the study

S.No	Institutions	Group	Sample	Test	Treatment	Duration	Test
1.	Institution I	Controlled Group	30	Pre test	Traditional method of Teaching	40 min	Post Test
		Experimental Group	30				
2.	Institution II	Controlled Group	30	Pre test	Synectics model of Teaching	40 min	Post test
		Experimental Group	30				

It can be seen that both the control and experimental groups complete the pretest and posttest, treatment group is the only group that receives the research treatment. This design is useful in evaluating the effect of counseling, testing medical treatment, measuring psychological constructs, etc. The process of experimental method can be drawn in to following phases:

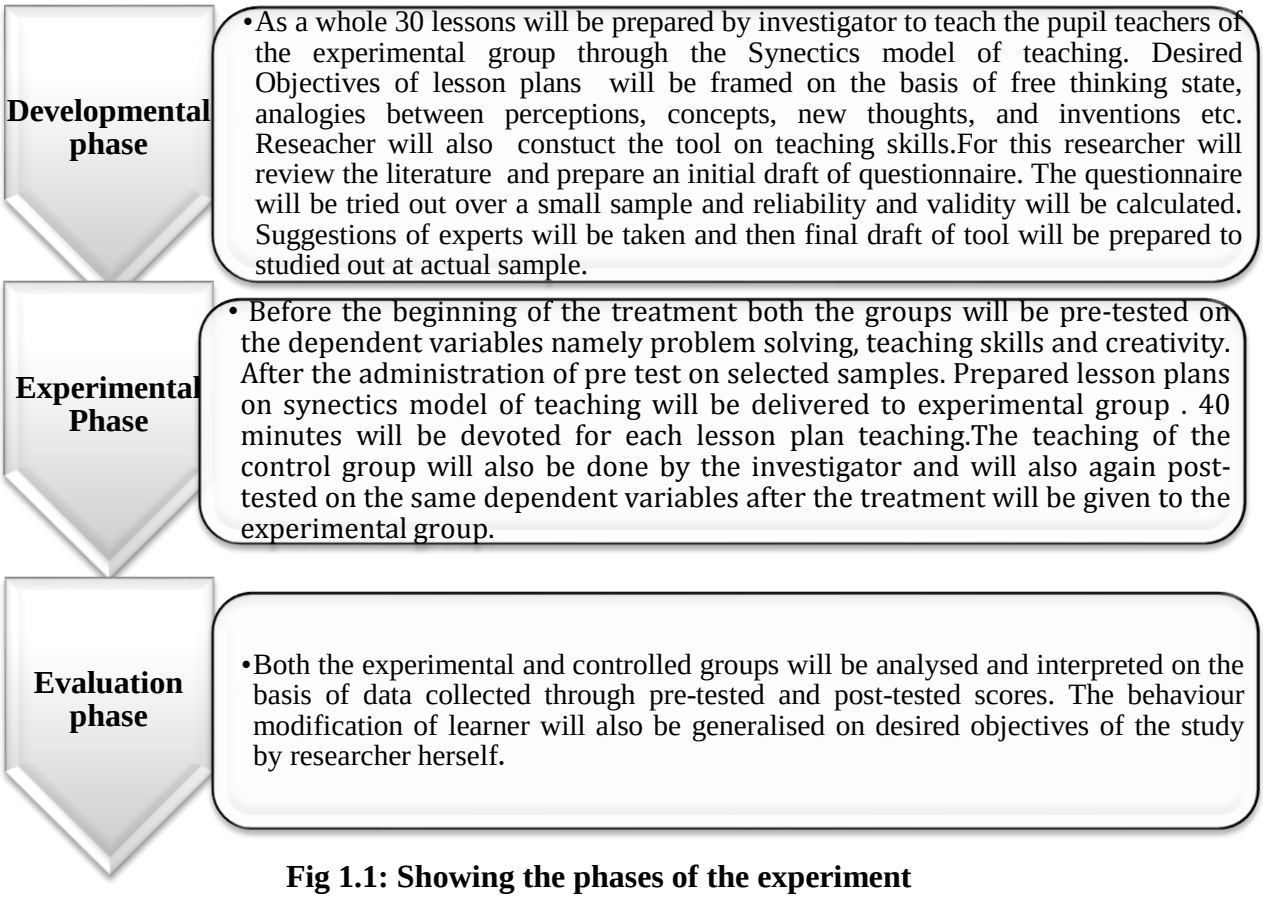
Developmental phase
•As a whole 30 lessons will be prepared by investigator to teach the pupil teachers of the experimental group through the Synectics model of teaching. Desired Objectives of lesson plans will be framed on the basis of free thinking state, analogies between perceptions, concepts, new thoughts, and inventions etc. Reseacher will also constuct the tool on teaching skills.For this researcher will review the literature and prepare an initial draft of questionnaire. The questionnaire will be tried out over a small sample and reliability and validity will be calculated. Suggestions of experts will be taken and then final draft of tool will be prepared to studied out at actual sample.
Experimental Phase
• Before the beginning of the treatment both the groups will be pre-tested on the dependent variables namely problem solving, teaching skills and creativity. After the administration of pre test on selected samples. Prepared lesson plans on synectics model of teaching will be delivered to experimental group . 40 minutes will be devoted for each lesson plan teaching.The teaching of the control group will also be done by the investigator and will also again post-tested on the same dependent variables after the treatment will be given to the experimental group.
Evaluation phase
•Both the experimental and controlled groups will be analysed and interpreted on the basis of data collected through pre-tested and post-tested scores. The behaviour modification of learner will also be generalised on desired objectives of the study by researcher herself.

Fig 1.1: Showing the phases of the experiment

So the design will be used to structure the research and show how all the major parts of research methodology (sample or groups, measure, treatments or programs and methods assignment) will work together to address the central research project.

1.11.3 Selection of the Sample

The process of sample selection is given below:

i. **Population-**The researcher will select 120 pupil teachers for controlled and experimental groups. Roughly about 380 students are studying in the institutions of Agra city therefore: the population of the present study is 380 pupil teachers make the population of the study.

ii. **Sample-** A sample is a small proportion of a population selected for observation and analysis. It is a collection, consisting of a part or subset of the objects or individual of population which is selected for the express purpose of presenting the population. The sample of the present study will be 120 pupil teachers of Agra city for controlled and experimental groups.

The researcher will apply the 'Purposive Sampling' only to select the sample of the study. The main goal of purposive sampling is to focus on particular characteristics of a population that are of interest, which will best enable to answer the research questions. So, 120 samples units will be selected by random method but it is not possible to perform the experimental study on this large population therefore 60 pupil teachers of social studies method will be selected for controlled group and 60 will be for experimental group for the study.

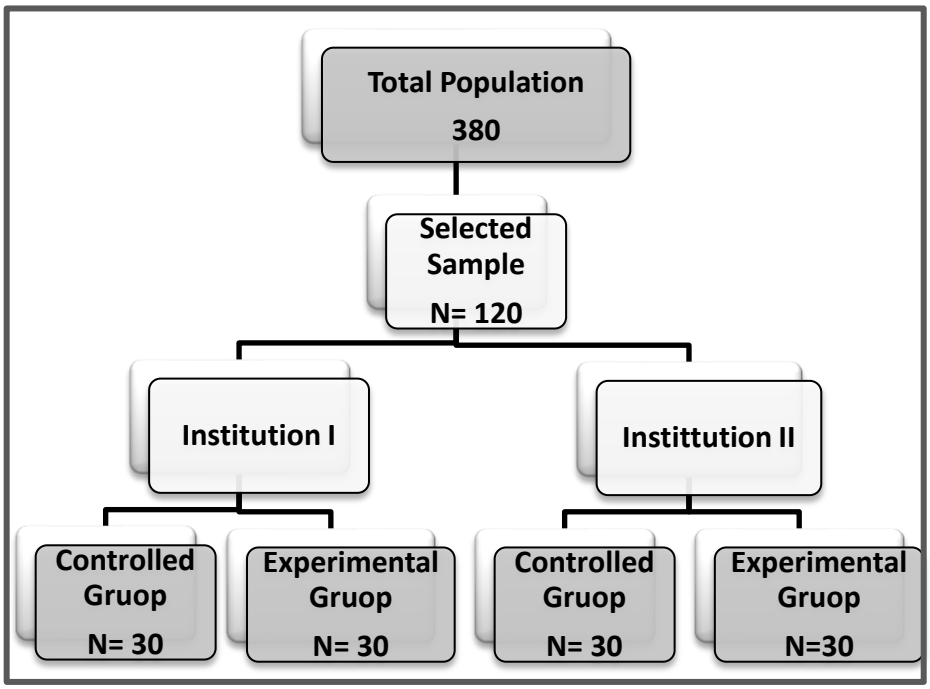

Fig 1.2: selection of the Sampling Units

To conclude, 120 pupil teachers will be selected for sample of the study.

1.11.4 Tools and Material of the Study

In order to attain the objectives of the study following tools will be used:

1. **Problem solving Inventory -:** The Problem Solving Inventory will be used. The scale has been developed by Heppner and Peterson (1982). The inventory consists of a 35-item self-report measure in a 6-point Likert style format (Strongly agree to strongly disagree).
2. **Creativity Test:** The researcher will be use "A New Test of Creativity by Dr. Roma Pal. The test Measures Fluency, Flexibility and Originality.
3. **Tool for Teaching Skills:** This variable of the study will be measured by the tool prepared by researcher.

1.11.5 Statistical Method

Following statistical techniques will be used in present investigation:

1.11.5.1 Measures of Central Tendency *viz.* Mean

1.11.5.2 Measures of Variability *viz.* Standard Deviation

1.11.5.3 Test of significance

1.12.0 Significance of the Study

Significance of study has been stated in the following points:

For Teachers

The study will improve quality of instruction as it provides systematic approach to it. It will also facilitate awareness about student's learning need. It will keep teachers and students actively engaged in the classroom activity. It will facilitate student engagement in more meaningful ways. It will be helpful to articulate new solutions to improve the job satisfaction among teachers and human resources problems. It may find the new ways to designing appropriate educational activities and to understand the difficulty level of subject.

For Students

The finding may help the student to enhance their problem solving ability, creative thinking power, imagination power as well as the reasoning power by the present study. The present study may useful to enhance the academic performance of the student as the Model will provide an environment for interactive student engagement.

For the curriculum developers

The findings may help in the construction of a curriculum or contents of a course and proper selection of instruction material for teaching the prepared course or the curriculum.

1.13.0 Overview of the Synopsis

The synopsis provided the blueprint of the research being carried out. Theoretical explanation of the variables of the study; Synectics Model, Problem solving, Creativity and Teaching skills has given. The details of main components of any research; objectives, hypotheses and variables were comprehensively explained. A precise explanation of the technical details; sample, method, research design, tools and statistical techniques that will be employed and administered were given. In the later section assumed significance of the present study was highlighted.

References

Akram, S. S. & Robabeh, M. (2010).The Effect of Employing Synectic Model in Teaching Palliative Care in Children on Nursing Students' Writing Creativity and Academic Performance. *Iraninan Journal of medical education, 9*(3), 239-248

*Aysun, Ö. K. & Serhat, E.(*2011). A sample study on synectics activities from creative thinking methods: creativity from the perspective of children. *International Journal of Human Sciences, 8*(2), 766-793

Best, J. & Kahn, J. (2006). *Research in education.* Boston: Pearson Education, Inc. Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education.* New York: Routledge.

Bruce J. & Marsdha W, (1980). Theoretical constructs of Models of Teaching. Retrieved from http://shodhganga.inflibnet.ac.in/bitstream/10603/418/8/08_chapter3.pdf

David E. W. (2009). *Promoting metaphorical thinking through synectics: developing deep thinking utilizing abstractions*. Retrieved from, http://facstaff.bloomu.edu/dwalker/Conference%20Information/IUT/Synectics.pdf

Duncker, K. (1945). On problem solving. *Psychological Monographs, 58*(5),270

Edward C. W. (2005). *Classroom Teaching Skills. The Research Findings of the Teacher*

Education Project. Retrieved from www.eric.ed.gov/ERICWebPortal/recordDetail?accno=ED241530

Garrett, H., E. (1981). *Statistics in Psychology and Education*. Bombay: Vikas, Fetter and Simon Ltd.

Greenwalls, S., Hedges, L.V., and Laine, P.D. (1996). "*The Effect of School Resources on Student Achievement*," Review of Education Research

Good, C. V. (1963). *Introduction to educational research: methodology of design in the behavioral and social sciences* (2d Ed.). New York: Appleton-Century-Crofts.

Good, C. V. (1966). *Essentials of educational research; methodology and design.* New York: Appleton-Century-Crofts.

Green, J., Camilli, G., & Elmore, P. (2006). *Handbook of complementary methods in education research.* New Jersey: Lawrence Erlbaum Associates, Inc.

Heppner, P.P. & Peterson, C.H. (1982). Th e Development and Implications of a Personal Problem-Solving Inventory. *Journal of Counseling Psychology*,29(1), 66-75

Heylighen F. (1998): Representation and Change. A Metarepresentational Framework for the Foundations of Physical and Cognitive Science, (Communication & Cognition, Gent), 200 p.

Jim S. (2011). *Learning teaching, Macmillan books for teachers*. Retrieved from www.macmillanenglish.com.

Joshua, A.(2007). Problems in the pipeline: Stereotype threat and women's achievement in high-level math courses. *Journal of Applied Developmental Psychology*, *29* (1), 17–28

Karen S. M. (1995):The Effect of Synectics Training on Gifted and Nongifted Kindergarten Students, *Journal for the Education of the Gifted, 18*(**1),** 55-73

Kothari, C. K. (1990). *Research Methodology: Methods & Techniques*. India. Wishwa Prakashan.

Koul, L. (1997). *Methodology of Educational Research*. New Delhi: Modern Printers.

Laura, H. (2006); Synectics for Creative Thinking in Technology Education. *International Technology Education Association (ITEA).66*(3) 22-27

Madahi, M. & Khalatbari, J. (2010). Comparison of effectiveness of the three methods of brainstorming, synectics and deductive on increasing creative thought in female students21Shahed University (IRAN) 2 Islamic Azad University of Tonekabon (IRAN), INTED2010 Proceedings__, 2010 4th International Technology, Education and Development Conference

Mayer, R. E., & Wittrock, R. C. (2006). Problem solving., *Handbook of educational psychology* (2nd ed.), pp. Mahwah, NJ: Erlbaum. 287–304.

Naiman linda (2011). Definition on creativity, Retrieved from http://www.creativityatwork.com/what-is-creativity/

National Research Council (NRC) (1996). Great Lakes Bioenergy Research Center. 1552 University Ave., Madison.

NCERT (1993), 6th *Educational Survey*, New Delhi: NCERT.

Pal, R. (1991). *A New Test of Creativity*. Agra Psychological Research Cell

Patel,R. (2010). *Development of an instructional strategy for primary school teachers to teach creative and critical thinking skills, Centre of Advanced Study in Education Faculty of Education and Psychology The Maharaja Sayajirao University of Baroda Vadodara-390 002*, Retrieved from http://www.msubaroda.ac.in/phd2010/Thesis15.pdf

Patil, R (2012). Effectiveness of Synectics Model (SM). *Indian Streams Research Journal*, *2*(5), 966

Rossman (1993). *Problem solving ability*. Retrieved from http://www.ndt-ed.org/TeachingResources/ClassroomTips/Problem-solving.htm

Sesadeba, P. (2010). Effectiveness of synectics model of teaching in enhancing creativity, academic achievement and achievement motivation of learners. Retrieved from http://www.aiaer.net/ejournal/vol20108/11.html

Shreyashi, P. (2008). Impact of synectics model of teaching in life science to develop creativity among pupils. Retrieved from http://www.aiaer.net/pdffiles/articleindex.pdf

Sidhu, K.S. (1987). *Methodology of Research in Education*. New Delhi: Sterling Publishers Pvt. Ltd.

Slavin, R. (2007). *Educational research in an age of accountability*. Boston: Pearson Education.

Stelios N. G., (1994). Synectics: A Problem-solving Tool for Educational Leaders. *International Journal of Educational Management*. *8*(2), 5

Steven G. R. (2010). Generalizations about Using Value-Added Measures of Teacher Quality, *The American Economic Review*, *100*(2), 267-271

Thakur,U. (2008). Making familiar strange (MFS) approach of synectics model of teaching : A Treatment For Enhancing Creativity And Academic Achievement Of Learners, Lovely School of Education Department of Education Phagwara

Thomas J. K., (2008) Estimating Teacher Impacts on Student Achievement: An Experimental Evaluation. *NBER*, Working Paper No. 14607

Tina, S. & Rechard, J. S.(2007) Methods for studying teacher and teaching effectiveness, Standford university and Technische Univrsitat,Monic Germany

Torrance, E. P.& Safter H. P. (1999). Making the creative leap beyond. Buffalo, NY: Creative Education Foundation Press.

Vani, M. (2012). Effectiveness of Synectics Model Of Teaching In Enhancing Language Creativity Of Learners, *Indian Stream Research Journal*, *2*(1), 2-8

Weiss, I. (1997). The Status of Science and Mathematics Teaching in the United States: Comparing Teacher Views and Classroom Practice, National Institute for Science Education, University of Wisconsin-Madison,

William,J.G.(1961).*The Synectic Model for Teaching English*. Retrieved from http://eltnotes.wordpress.com/2010/05/13/8-the-synectic-model-for-teaching-english/